phocos CIS-N-MPPT 85/15 MPPT Solar Charge Controller User Manual

Contents

phocos CIS-N-MPPT 85/15 MPPT Solar Charge Controller

Dear Customer,

Congratulations on buying your Phocos product! Please read the instructions carefully and thoroughly before using the product. It comes with a number of outstanding features, such as:

- Maximum Power Point Tracking technology, which increases the efficiency of your PV system
- Negative grounding
- Dimming function
- Case protection: IP68, in 1.5 m deep water for 72 hours
- Control unit **(CIS-CU)** to configure CIS-N-MPPT 85/15 charge controller, via infra-red data link
- Data logger via CISCO software and MXI-IR interface
- External temperature sensor for temperature compensation of charging voltages
- 4-stage charging **(main, boost, equalization, float)** for a flooded battery; 3-stage charging **(main, boost, float)** for a sealed battery

- Automatic recognition of system voltage 12/24 V
- Widely programmable

General Safety Information

This manual contains important installation, setup, and safety operating instructions. Please read the instructions and warnings in this manual carefully before beginning any installation. Please do not disassemble or attempt to repair Phocos products. Phocos charge controllers do not contain user-serviceable parts. Please observe all instructions with regard to external fuses/breakers as indicated. The information contained in this manual must be observed to its full extent. The manual contains information regarding installation, setup, and operation. Please read this manual carefully before using the product, and pay special attention to the safety recommendations in it.

Maintenance and installation notes

When installing or working on the PV system, please disconnect the PV (solar) modules from the charge controller first, to prevent any damage to the charge controller! Please verify that all cable/wire connections are done properly and well insulated and that no water or humidity can ingress in order to avoid any bad or loose connections that would result in excessive heating or further damage. Please install a fuse or breaker near the battery before installing or adjusting the controller!

High voltage risks

Never touch any electrical conductors to avoid electrical shock.
Never work on life (energized) electrical equipment.
When working around a battery, do not allow tools to bridge the battery terminals, or short-circuit any part of the battery.
Use only tools with insulated handles.
Operation of this device may produce a high voltage which could cause severe injuries or death in case of improper installation or operation of the device.
PV modules can generate high DC voltages!

Mains and charging current risks

Make sure the cables are always connected to the correct terminal. An electrical shock can be lethal. In general, any electric shock can be dangerous to your health.

CE labeling

The product is CE-compliant

Maximum PowerPoint Tracking. Technology

Up to 98% power conversion efficiency

Type of protection IP68

Infrared interface

Electronic fuse

Dimming function

Deep discharge protection

Fit for flooded and GEL battery

Ambient temperature: -40°C to +60°C

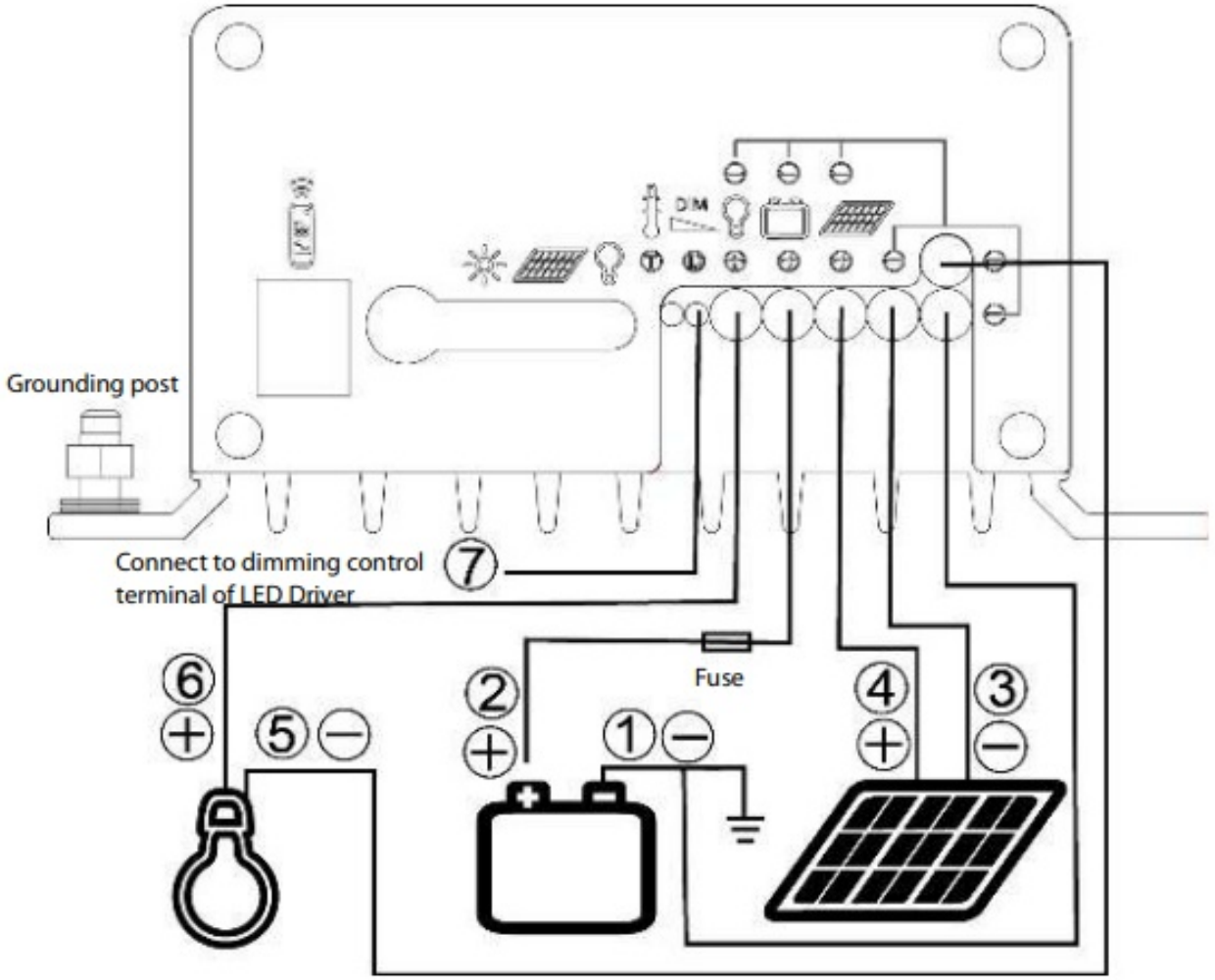
External temperature sensor

12/24 V, automatic recognition

Negative grounding

Connecting and Grounding

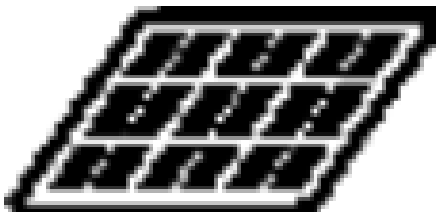
- The controller warms up during operation, and should therefore be installed on a nonflammable surface only.
- Connect wires in indicated order 1 2 3 4 5 6 7 to avoid any installation faults
- To avoid any damaging voltage on the wires, first, connect the wire to the controller, then to the battery, to the panel, or to the load
- Minimum recommended wire size: 4 mm^2
- Make sure the wire length between the battery and the controller is as short as possible
- Be aware that all negative wires of CIS-N-MPPT 85/15 are connected together and therefore have the same electrical potential. If any grounding is required further to the casing, always do this on the negative wires.
- Grounding of the casing is done by the grounding post on the left side.
- When connecting inductive loads (motors, relays, etc.) a freewheel diode must be connected in parallel to the loads in the reverse-biased direction.
- Inverters should always be connected directly to the battery due to their high inrush currents.



	Function	Cable marker	Wire size(cross section)	Color
①	Negativebatteryterminal	COMMON-	AWG13(2.5mm2)	black
②	Positivebatteryterminal	BATERY+	AWG13(2.5mm2)	red
③	Negativepanelterminal	COMMON-	AWG13(2.5mm2)	black
④	Positivepanelterminal	SOLAR+	AWG13(2.5mm2)	yellow
⑤	Negativeloadterminal	COMMON-	AWG13(2.5mm2)	black
⑥	Positiveloadterminal	LOAD+	AWG13(2.5mm2)	orange

⑦	Dimmingsignalterminal	–	AWG24(0.25mm 2)	black

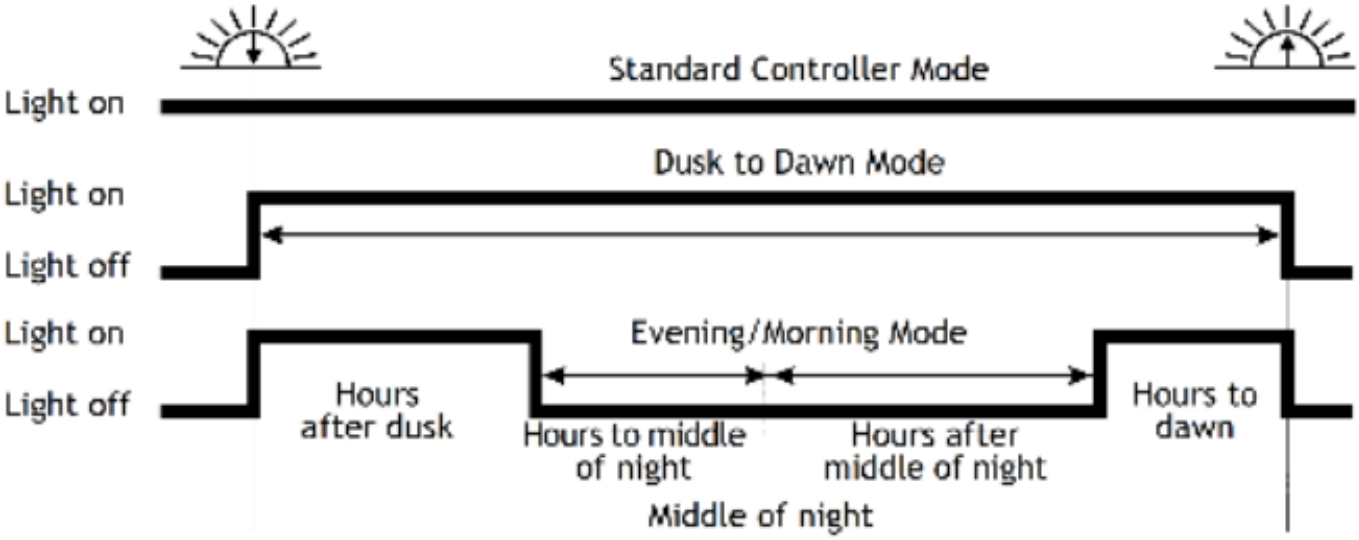
LEDindications&warningfunctions

LED	Status	Function
	On	Controller **n**ected to batte ry,night detected
	Flash	Controller **n**ected to ba**t**er y,day detected
	O**f**	Noba**t**eryco **n**ected
	On	Chargingfailure(overvoltag e/overcu**r**ent)
	O**f**	ChargingOK
	On	Loadlow/high voltage disc onnect(LVD/HVD)
	Flash	Loadovercu**r**ent
	O**f**	look

A**l**LED	Gr**e**n->Red->Gr**e**n->	Programming

Night-Light Function

The CIS-N-MPPT 85/15 controller comes with a sophisticated night-light function. It controls the load output at night and also is widely programmable. 3 operating modes are available:
Standard Controller, Dusk to Dawn and Evening/Morning.



"Middle of the night" is automatically detected as the midpoint between dusk and dawn; no setting of a clock is required. It may take several days until the controller has "learned" the middle of the night precisely**. "Middle of the night"** may be different from 12:00 midnight depending on your location/longitude. The controller recognizes day and night based on the solar array's open circuit voltage. The day/night threshold can be modified according to your local light conditions and the type of solar array used.

Dimming Function

- Output voltage 0 V to 10 V relative to battery minus pole (adjust step 1 V, 3% tolerance)
- Impedance 1,000 Ohm
- Load hours (load 1 on CIS-CU case printing) and Dimming hours **(load 2 on CIS-CU case printing) work together to affect the dimming function:**

	No dimming	Dimmingison	Load of
Load hours	on	on	o**f**
Dimminghours	on	o**f**	N/A
Dimmingoutputvoltage	10V	Voltageproportionaltoadjusted dimming value	0V

- Corresponding relationship of 'Output voltage' and 'Dimming value'

Output voltage	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
Dimmingvalue*	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

*** :** +/- 3% tolerance

Testing Function

Pushing the test button on the CIS-CU **(Control Unit)** will switch on the load terminal for 1 minute. Should pressing the button cause a load disconnect event **(LVD/SOC, over current)** then the load will be switched off immediately.

Safety Features

	PVterminal	Bateryterminal	Loadterminal
Reverse polarity	Protected(1)	Notprotected(2)	Protected(3)
Shortcircuit(4)	Protected	Protected(5)	Switchesofimmediately
Overcurrent	Limited	–	Switchesofwithadelay(6)
Reverse current	Protected(7)	–	–
Overvoltage	Max.85V(8)	Max.50V	Switchesofabove15.5/31.0V
Undervoltage	–	–	Switchesof
Overtemperature	Reducesthechargingcurentifovertemperatureocursandswitchesoftheloadifthetemperaturereachesahigh level.		

1. Panels are short-circuited by diodes. The controller can therefore only be subjected to these conditions for a limited time. A Battery connected to the panel terminals in reverse polarity will instantly cause damage to the controller.

2. A battery fuse is necessary to protect the CIS-N-MPPT from getting damaged by the reverse polarity connections on the battery terminals.
3. A controller can protect itself, but any connected loads might be damaged.
4. Short circuit: >3x – 20x nominal current.
5. The battery must be protected by a fuse, or it might be permanently damaged in case of a short circuit.
6. >200% nominal current: disconnects with 3s delay, >150% nominal current: disconnects with 10s delay, >110% nominal current: disconnects with 120s delay.
7. MPPT switches off when detecting reverse current.
8. At voltages above 85 V, the MPPT will stop charging.
   WARNING: The combination of different error conditions may cause damage to the controller. Always remove the fault condition before you continue with connecting the controller!

Low Voltage Disconnect Function (LVD)

- State of charge controlled (SOC): Disconnect at 11.00/22.00 V to 11.70/23.40 V(SOC1), 11.12/22.24 V to 11.76/23.52 V(SOC2), 11.25/22.50 V to 11.83/23.63 V(SOC3), 11.38/22.72 V to 11.89/23.78 V(SOC4), 11.51/23.02 V to 11.96/23.92 V(SOC5), 11.64/23.28 V to 12.02/24.04 V(SOC6).

Voltage controlled (LVD): Disconnects at a fixed voltage between 11.0/22.0 V and 11.9/23.8 V (voltage steps 0.1/0.2 V).
Note:
Battery voltage must be below the adjusted setting for longer than 2 minutes before LVD occurs.
Note:
Voltage levels before/after the slash are valid for 12 V and 24 V systems respectively **(valid for the charge controllers presented in this manual).**

Factory Settings

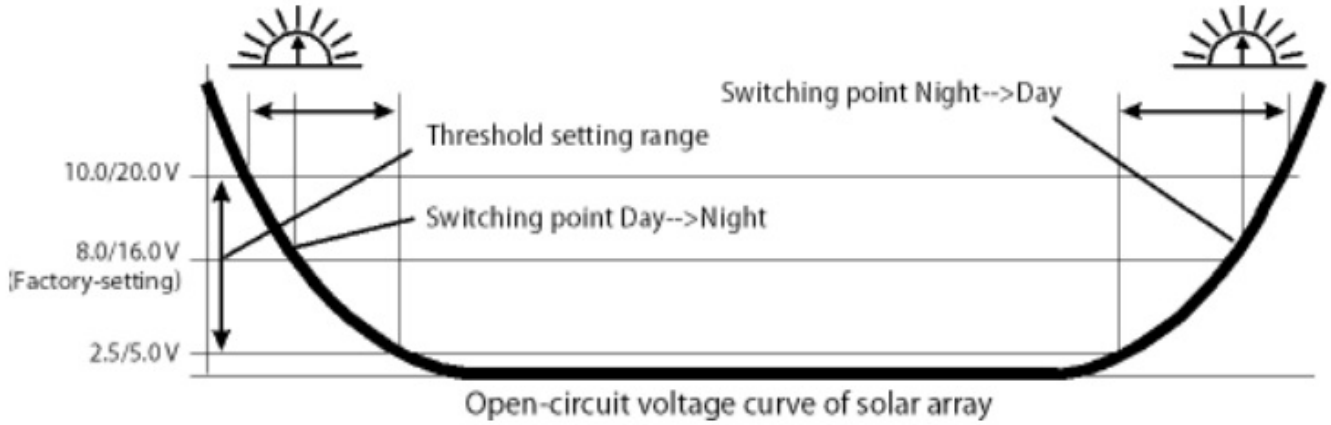
You can configure CIS-N-MPPT 85/15 charge controllers via the Remote Control Unit (CIS-CU). See the CIS-CU manual for details.

	Factory setting
Load more	Standard controller(nightlight)
Lowvoltagedisco **next**	SOC4
Battery type	Gel
Nightlightlevel	8.0/16.0V(1)
Load1eveninghours	0h
Load1morninghours	0h
Dimmingeveninghours	0h
Dimmingmorninghours	0h
Dimmingvalue	50%

1. **PV panel open circuit voltage:** Day level = Night level + 1.5/3.0 V

Night light level

The controller recognizes “day” and “night” based on the solar PV array open circuit voltage. The daylight threshold can be modified according to the requirements of the local conditions and the solar PV array used.
To find the exact values, we recommend measuring the PV solar array “open circuit voltage” at twilight and when the controller is expected to switch the loads “on” or “off”. This value (the closest setting available) can then be set according to the description presented in the programming section.



Technical Data

Note: The voltage levels before/after the slash are valid for 12 V and 24 V systems respectively.

TechnicalData	CIS-N-M **P**T85/15
Systemvoltage	12/24Vautorecognition
Max.chargecu**r**ent	15A*
Max.loadcu**r**ent	15A*
Max.PVinputpower	250W@12V,5**0**W@24Vsystem
Powerconversione**f**iciency:	Upto98%
Floatcharge	13.8/27.6V(25°C)
Maincharge	14.4V(25°C),0.5h(daily)
B**o**stcharge	14.4/28.8V(25°C),2h,activation:ba**t**eryvoltage<12.3/24.6V

Equalization	14.8/29.6V(25°C),2h, Activation:bateryvoltage<12.1/24.2V(atleastonetimeevery30days)
Overvoltageprotection	15.5/31.0V
D epdischargeprotection, Cut-ofvoltage	1.0-12.02/2.0-24.04VbySOC 1.0-1.9/2.0-23.8Vbyvoltage(adjustablestep0.1/0.2V)
Reco **next level**	12.8/25.6V
Undervoltageprotection	10.5/21.0V
Min.operating voltage	9V
Max.PV voltage	85V
Min.PVvoltage	17/34V
Max. bateryvoltage	50V
Temperature compensation(charge voltage)	25mV@12V/50mV@24V
Self-consumption	<10mA
Grounding	Negative grounding

Ambien **t**emperature	–40to+60°C
Max. altitude	4, **0**mabovesealevel
Battery type	Lead acid(GEL,AGM,flooded)
Adjustment range: Evening hours Morninghours N ightdetection Daydetection	0–15h 0–14h 2.5–10.0V/5.0–20.0V(adjuststep0.5/1.0V) 4.0– **1**.5V/8.0–23.0V(adjuststep0.5/1.0V)

Wire length	20cm
Dimensions(WxHxD)	**8**.5x150x41.4mm
Weight	780g
Wirecro **s**ection	AWG13(2.5mm2)
Type of protection	IP68(1.5m,72h)

Dimmingoutput	CIS-N-M **P**T85/15
Dimmingvalue	0–1**0**%outputpower(adjuststep10%)
Dimmingoutputvoltage	0Vto10Vrelativetoba**t**eryminus
Impedance	1, **0**Ohm

****:** At 60°C CIS-N-MPPT, 85/15 can only have full current on either panel or load, not simultaneously.

Liability Exclusion

The manufacturer shall not be liable for damages, especially on the battery, caused by use other than as intended or as mentioned in this manual or if the recommendations of the battery manufacturer are neglected. The manufacturer shall not be liable if there has been service or repair carried out by any unauthorized person, unusual use, wrong installation, or bad system design.

Specifications are subject to change without notice.
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Documents / Resources

	phocos CIS-N-MPPT 85/15 MPPT Solar Charge Controller [pdf] User Manual CIS-N-MPPT 85 15, MPPT Solar Charge Controller, CIS-N-MPPT 85 15 MPPT Solar Charge Controller, Solar Charge Controller, Charge Controller, Controller